

QUININE

AS A

PROPHYLACTIC AGAINST MALARIAL FEVER:

BEING AN

A P P E N D I X

TO THE

THIRD REPORT

ON

Typhoid and Malarial Fevers,

DELIVERED TO THE

SURGEON GENERAL OF THE LATE C. S. A., AUGUST, 1864.

BY

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the white man. In the early settlement of South Carolina and Georgia, the inhabitants in most instances resided the whole year upon their rich rice and indigo plantations ; many, however, soon fell victims to the climate, or dragged out a miserable existence, with constitutions broken and rendered prematurely old, by repeated attacks of climate fever. The clearing of the forests, of the swamps and rich low-lands, and the consequent exposure to the sun of the vegetable matter which had been accumulating for ages, rendered the climate so deleterious to the white race, that the planters were compelled to seek health during the summer and fall months, in sea island, or in pine barren, or mountainous retreats ; and with the most efficient precautions, the mortality of these regions is far greater than in the more elevated portions of the Southern States.

The following facts will illustrate the effects of the climate of the swamps, rice fields and river bottoms, upon the mortality of the white race.

In the Midway Congregational Church, of Liberty co., Ga., (formerly St. John's Parish) the number of births from 1754 to 1804, was 600, whilst the number of deaths during this period was 628, thus showing an actual decrease during 50 years of 28. In 1817 there were 49 deaths in this congregation, which did not number more than 340 whites, showing a mortality of one in every seven of the inhabitants (14.4 per cent. ;) of the 49 deaths, 34 occurred in four months, July, August, September and October, and were in almost every case the effects of climate fever : and other years might be cited in which, if the mortality did not rise to so high a figure, it still rose to such alarming figures, as from one in every ten, to one in every seventeen inhabitants.

This heavy mortality was clearly referable to climate, for it is believed that no body of citizens in the Southern country excels this congregation in intelligence and virtue, or in the careful regard for the substantial comfort and health of its families.

Before the Revolutionary war, whilst Sunbury on the coast of Georgia, was in a highly prosperous condition, 70 emigrants came from the Bermuda Islands : of this number 50 died the first year from climate fever.

Savannah, situated on a sandy plain, terminated on the north

by a turbid sluggish stream, and flanked on the east and west by extensive tide swamps, afforded during the period that these low lands were cultivated in rice, a good field for the determination of the probable mortality of troops exposed to the climate of rich river-bottoms and inland swamps. The dry culture system was commenced with the lands surrounding Savannah, in 1818; we shall therefore for our present purpose, deal with the mortuary records of the city, and during the wet culture system, as far as they extend back from 1818: premising, however, that after the institution of the dry culture system, the health of Savannah, excepting the years when the yellow fever prevailed, has progressively improved, and will now compare favorably with cities situated in the same latitudes, and surrounded by similar alluvial deposits. After a careful examination of the records of the city, I have been able to discover no record of date earlier than 1804.

The deaths of the blacks are excluded from the following statistics. The sum of the deaths of the foreigners and natives, does not always correspond with the total deaths from climate fever, because, in some instances, the nativities are not given in the record.

DEATHS AMONGST THE WHITES IN SAVANNAH FROM 1804 TO 1818.

	Deaths during July, August, September & October.	Deaths from, cli- mate Fever ..	Deaths of for- eigners from climate Fever.	Deaths of Na- tives from Cli- mate Fever. ...	Total Deaths from all dis- eases.
1804.....	118	77	63	14	207
1805.....	141	112	78	22	238
1806.....	120	52	43	9	159
1807.....	124	80	71	9	230
1808.....	103	77	67	8	219
1809.....	98	63	52	9	183
1810.....	79	46	38	8	163
1811.....	114	87	73	13	212
1812.....	132	120	92	24	226
1813.....	109	64	45	19	214
1814.....	185	166	138	23	300
1815.....	140	130	104	18	233
1816.....	161	146	91	38	272
1817.....	283	313	236	57	461

The population of Savaunah in 1800 was 5,166: of these 2,799 were whites and 2,367 slaves. In 1808 the population was 6,464; of these 3,010 were whites and 3,454 slaves. In 1810, the entire population was 5,215 ; in 1820, entire population 7,523.

Whilst the records of the population of Savannah at different periods are not as full and explicit as could be wished, still from the data now presented we may institute comparisions, and determine the average mortality for each year with a very close approximation to the absolute numbers : thus in 1804, the proportion of deaths in round numbers of the whites to the white population, was 1 in 13; 1805, 1 in 12; 1806, 1 in 18; 1807, 1 in 12; 1808, 1 in 13; 1809, 1 in 16; 1810, 1 in 18; 1811, 1 in 14; 1812, 1 in 13; 1813, 1 in 14; 1814, 1 in 10; 1815, 1 in 14; 1816, 1 in 13; 1817, 1 in 9.

If we compare the mortality from climate fever, of the strangers and foreigners, under which class we include the seamen, who form a large part of the transient population of Savannah, we will see that the deaths amongst this class were more than four times as numerous as the deaths of the natives. This fact illustrates still more strongly the great risks and sickness, if not heavy mortality, which must attend the transportation of troops from Middle Georgia, and from any part of the high mountainous tracts of the Southern States to the swamps and rich rice grounds, during the months of July, August, September and October ; for without doubt the observation was made by the reader as he reviewed the preceding figures, that the rate of mortality in Savannah during the wet culture system, frequently rose to a figure which in healthy regions would have been considered as the results of pestilence ; and the correctness of this observation is placed in the clearest light, when it is known that the annual mortality in England* is one in every 45 of the living ; in France, 1 in every 42 ; in the New England States, 1 in 64 ; in the Middle States, 1 in 73 ; Coast planting States, 1 in 73 ; Northern States 1 in 80. †

Whilst we will readily grant that the improved method of

*Sixth Annual Report of the Registrar General of England, 1847.

†Census of United States, 1850.

medical treatment of the present day would greatly diminish the rates of mortality, we would on the other hand affirm that these improvements in practice would have little to do with the prevention of disease. We have therefore presented this view of the rates of mortality in these localities, rather to demonstrate the liability of men exposed in this climate to disease, and thus to establish the importance of the present inquiry ; for an army may be rendered almost as ineffective by sickness as by death.

The medical statistics of Oglethorpe Barracks during the period they were situated one mile south of the city of Savannah, just back of the present jail, illustrates still more forcibly the sickness and mortality of troops encamped in localities surrounded with rice fields and marshes. In 1828 during the months of July, August and September, there occurred 23 deaths in a command of 95 men ; and during the months of October, November and December, 18 deaths in a strength of 85 men ; the total deaths for the year was 52, besides 19 women and children—Remittent fever and dysentery were the fatal diseases which caused the high mortality. During 10 years, from 1829 to 1839, the annual ratio or mortality was 5.5-10 per cent ; the annual ratio of Intermittents was 67 per cent, and that of Remittents 22 per cent ; and every man was on an average during this period, reported in a little less than every five months. So prevalent and fatal were the diseases in summer and fall seasons, that this post was finally abandoned.

The Medical statistics of the Augusta Arsenal whilst it was situated on the banks of the Savannah river, correspond with those of the Oglethorpe Barraeks ; disease prevailed to so great an extent that it was necessary to abandon the post in the summer season, and encamp on the Sand Hills.

These observations might be still further strengthened by the presentation of the rates of mortality of rice plantations, this subject, however, will be treated more fully, hereafter, and we will merely state the result of an extended personal examination of the mortuary statistics of rice plantations ; the number of births in proportion to inhabitants does not differ materially from the number in the healthiest re-

gions, but the mortality, especially amongst the young is far greater—in fact so great that during many years instead of an increase, there is either a stationary condition, or an actual decrease.

The facts which have now been presented are sufficient to justify the attempt to devise some means to ward off the climate fever.

During the study of the relations of climate and soil to disease, the collection of the mortuary statistics and the investigation of the causes of diseases upon rice and cotton plantations; and during the discharge of the duties of Chemist to the Cotton Planters' Convention of Georgia, the author has necessarily been greatly exposed to the agents which produce climate fever, and the results of his experience now presented, cannot therefore be said to be wanting the test of actual experiment.

Under these exposures I have found that Sulphate of Quinia taken in from 3 to 5 grains twice during the day would, in most cases, prevent the occurrence of Malarial Fever, and if it failed to ward it off entirely, the attack would be of a very slight character. I have still farther observed that when the climate fever first appeared, with a sense of lassitude, headache and excitement of the pulse, with alternate flushings, it might be arrested by a dose of from five to ten grains of Sulphate of Quinia, in combination with Bicarbonate of Potassa and Hoffman's Anodyne. From 5 to 15 grains of the Sulphate of Quinia may be given, according to the urgency of the symptoms, united with 15 grains of Bicarbonate of Potassa and fʒii of Hoffman's Anodyne. From 5 to 15 grains of Gum Camphor; the whole to be dissolved in fʒvi of water. The feet should be placed in hot water immediately after, or before, the administration of the remedies, and the patient after this bath should be covered up in bed, so as to promote free perspiration and induce quiet sleep. I have frequently gone to bed in a feverish, restless state, with a severe headache, excited pulse, and pain in the limbs, and dry, warm skin, and under the action of these remedies, arose in the morning refreshed and able to resume active operations. The Bi-Carbonate of Potash is here recommended, instead of the

Porto-Carbonate, (Salts of Tartar,) which is in such common use, during fever, in the Southern country, because it is far less active in its effects upon the stomach, and may be taken in much larger doses, and accomplishes more effectually the neutralization of the acid which is so often abundant in the stomach at the commencement of malarial fever, and more effectually acts upon the liver and the kidneys, and promotes the removal of all offending matters from the blood.

The late lamented Dr. Charles West, of Savannah, informed me that during his practice in Burke County, it was his custom to arrest attacks of climate fever, at the outstep, when the first symptoms were manifested, by Sulphate of Quinia; my former colleague, Dr. Dugas, Professor of Surgery in the Medical College of Georgia, informed me that he has used this medicine in a similar manner; and we have been informed that the energetic Superintendent of the Savannah & Charleston Road, which passes through a most sickly region of country, preserved the health of his white laborers by the daily use of small doses of Sulphate of Quinia.

We would recommend the use of Quinia as a preventive of Climate fever, in the following manner:

R.	Sulphate of Quinia,	-	-	grains, iii.
	Dilute Aromatic Sulphuric Acid,			drops, v.
	Brandy,	-	-	tablespoonful, 1.
	Water,	-	-	wineglassfuls, ii.

Drop the diluted Aromatic Sulphuric Acid upon the Sulphate of Quinia, and then add the brandy and water. Administer twice during the day, after rising in the morning, and just before bed-time.

To render the value of this means of warding off climate fever still more evident, we will cite the practice and success of the British Surgeons upon the coast of Africa, premising at the outset, that the endemic climate fever of Africa does not differ in any essential manner, except, perhaps, in its severity, either in its causes, symptoms or effects, from the malarial fever of North America.

The value of Sulphate of Quinia in warding off the climate

fever of Africa, can be determined only by instituting a comparison between the effects of the disease before and after the use of this medicine as a prophylactic.

The celebrated traveller, Mungo Park, suffered from two severe attacks of fever, upon his first tour through the interior of Africa, and at the conclusion of his journey the color of his skin was so altered by the disordered state of his liver induced by African fever, that he could scarcely be distinguished from a Moor; and upon his second visit to Africa, not only was he brought to the borders of the grave by climate fever, but 32 out of the 38 men who left with him the banks of the Gambia, fell victims to African fever in less than two months.

The vessel sent out in 1618, to relieve the English Explorer, Thompson, on the banks of the Gambia, lost almost the entire crew with fever, and at the very outstep, failed to accomplish the desired object.

The enterprising traveller, Ledyard, who had spent his life in travelling, and had sailed around the world with Captain Cook, had lived for several years with the North American Indians, and had travelled from Stockholm, round the Gulf of Bothnia, and thence to the remotest parts of Asiatic Russia, died of African fever, in the very commencement of his journey to explore this continent.

Numerous other travellers might be mentioned, as Nicholls, Morrison, Pearee, Clapperton, and the active, athletic and temperate Frederic Horneman, who fell victims to the endemic climate fever of Africa.

The splendid expedition to the Congo, under command of Captain Tuckey, provided with a crew of fifty active individuals, and with a Botanist, Zoologist, comparative Anatomist, and a most competent Physician, melted away under the influence of the damp and burning climate, and ended with the loss of the Captain, all the officers and scientific men. A similar termination closed the expedition of Major Peddie, for the discovery of the Niger.

The average mortality amongst the better classes in Sierra Leone, according to the testimony of Dr. Nichol, Deputy Inspec-

tor of Hospital, was formerly about one in twelve, or very nearly nine per cent.

According to Mr. Tiddie, acting Staff Surgeon at Cape Coast Castle in 1819, all the new-comers from England were seized with fever, and one-half died, more than one-third of the resident Europeans who had been there more than one year were seized with fever, and one-eighth died; in 1820 all the new-comers were seized with the fever, and one-half of them died, and of the older residents one-ninth died; in 1821 all the new-comers were seized with fever, and one-third died, whilst of the older residents near one-sixth died; thus making an average of one death out of every two and two-thirds, of the new-comers during the first twelve months after their arrival, and one death out of every eight of the resident Europeans who had been there more than one year.

From the Report of Dr. Barry, Deputy Inspector of Hospitals in 1822, we learn that twelve white sergeants from the Isle of Wight, selected as good and healthy men of regular habits, were attacked with fever, upon their arrival upon the coast of Africa, and within a few months after their arrival, eight paid the debt of nature, and the constitutions of three of the remaining four were permanently injured, whilst the sickness and mortality amongst their wives and children were nearly in the same proportion.

According to Mr. William Ferguson, Surgeon to the Royal African Colonial Corps, in the third quarter of 1824, the mean strength of British soldiers at Sierra Leone, was 585, of this number 386 were attacked with this African climate fever; 161 died, showing one death to 3.63 of the strength, and one death to 2.39 cases treated; at Gambia during the same period, the strength was 108, cases of Malarial fever 92, deaths 74, giving a proportion of 1 death to 1.45 of the original strength, and 1 death to 1.24 of the cases treated: at the Isles de Los, during the same period the mean strength was 103, cases of Malarial fever 99, deaths 23, showing 1 death in 4.47 of the strength, and 1 death in 4.3 of the cases treated. Captain W. F. Owen of the Royal Navy, in his attempt in 1827 to found a settlement at

Fernando, Po., lost almost his entire colony from the Endemic fever of Africa ; and Colonel Nicholls who followed him in a similar attempt had one attack of Remittent fever, and eleven attacks of Intermittent fever, and lost twenty-five out of thirty individuals who composed the company.

Numerous other examples might be brought forward to show the dreadful effects of the climate of Africa upon foreigners, unprotected by the sulphate of quinia ; we will, however, allude to but one more—the expedition of H. B. M. ships Wilberforce, Albert and Soudan, during the years 1841 and 1842, up the Niger with the leading object of promoting the abolition of the slave trade. When the expedition entered the Nun branch of the Niger, on the 13th of August, its complement of men and officers consisted of, officers including civilians and engineers 53, white seamen 63, marines and sappers 29, total number of whites 145 ; men of color entered in England 25, Kroomen and liberated Africans entered on the coast 110 ; blacks or model farm 23 ; total black 158 ; grand total 303. The health of the expedition continued good until the ships had proceeded two hundred and fifty miles from the mouth of the river, on the 4th of September, when a most malignant fever appeared in all the vessels, and spread with great rapidity. The first death took place on the 9th ; and on the 17th there were 69 sick, 63 of whom were whites ; and seven whites had died. The expedition was now so disabled that it was deemed advisable to send two of the ships back to sea ; on the 19th the Soudan started for the mouth of the river with forty cases of fever, and was followed by the Wilberforce, with nearly an equal number of sick, on the 21st. The Albert continued up the river, the officers believing that the violence of the fever was in a measure exhausted, and that the climate of the more open country, higher up the Niger, would be found more healthy. The result proved otherwise. When the ship had arrived at Egga, 340 miles from the sea, not less than twenty more of the crew had been attacked, of whom two had died ; and on the 3d of October there remained, capable of doing any duty, only one white seaman, the sergeant and one private

of marines, the geologist, the mate, one hospital attendant, and the surgeon, Dr. McWilliam: the entire enterprise was now abandoned, and the *Albert* steamed down the river to Fernando Po. Of the 145 whites who entered the Niger in good health, 130 were attacked with fever, and 42 died; of the 158 blacks, only 11 had the fever, and that in its mildest forms, and not one died.

The ratio of the men attacked by fever in the *Albert* was 1 in 1.127, the ratio of deaths in total number victualled was 1 in 2.696; and in the number of cases, 1 in 2.391; the ratio of the men attacked by fever in the *Wilberforce* was 1 in 1.666, ratio of deaths in number victualled, 1 in 8; ratio of deaths in number of cases, 1 in 6.857; the entire crew of the *Soudan* were attacked with fever; the ratio of deaths in total number victualled was 1 in 2.7.

We will now compare these facts and rates of mortality with the health of the British Squadron, employed for the suppression of the slave trade on the west coast of Africa, since the systematic employment of the Sulphate of Quinia as a prophylactic.

The observations which we will now present, are from the most reliable of all sources: the "Statistical Report of the Health of the Royal Navy," and we shall refer especially to the reports for 1856 and 1857, printed by the House of Commons, July, 1858, and August, 1859.

In 1856, the squadron employed for the suppression of the slave trade on the west coast of Africa, consisted of twenty-one vessels, with a mean force, including Kroomen and African boys, of 1630 men of all ranks and ratings. The number of men daily inefficient from wounds and sickness on the west coast of Africa, averaged about 55 per 1,000 of mean force.

The following summary taken from the nosological returns, will not only show that the great source of malarial fever in the squadron is exposure to effluvia or miasmata, while on shore, or in boats near the shore, or by the entrance of the cruisers into the large tidal rivers, but also that the great means of warding off the epidemic climate fever, and of moderating its

violence and duration, was the daily administration of the Sulphate of Quinia to the men during exposure to the noxious miasmata.

The Bloodhound remained during the entire year on the northern division of the station. In March she steamed about 300 miles up the Benin river ; while in the river and for fourteen days afterwards, from three to six grains of the disulphate of Quinine were given to each of the ship's company as a preventive of fever, and although they were exposed to the emanations from the mangrove swamps for twenty-seven days, only six suffered slightly from fever.

Some time afterwards they were again exposed to miasmata in the Bonny, New Calabar, and in the Sherbro, the last one of the most dangerous rivers for Europeans on the whole station ; but Quinine in solution was invariably used as a prophylactic, and with good effect, as only one case occurred after the vessel had been for a week in the Sherbro, and the patient was the only person who did not take the quinine regularly. No death occurred in this vessel from fever, but one man was invalided for its sequela.

The Childers was employed almost constantly cruising, for the first six months of the year off the coast, in the Gulf of Guinea, and during the remaining months, off the coast, between Loango and Benguela. With the exception of a few unimportant cases, her crew entirely escaped fever, until three boats were sent on detached service up the Lagos River ; in these there were twenty-seven white men and five officers. They remained absent for two nights, one of which was spent at anchor, off the town of Lagos. The surgeon accompanied the expedition and gave quinine-wine, which was continued after they returned on board : still notwithstanding, nine of the thirty-two persons who formed the party, were attacked with fever ; two in five days after their return to the ship, one on the sixth day, one on the eight, one the ninth, one on the thirteenth, two on the sixteenth, and one on the seventeenth. The disease in all was the same, differing only in its degree of intensity ; some were convalescent on the eighth or ninth day, and others not before the twenty-eighth ;

one had a jaundiced appearance. The surgeon thought the fever would have assumed a worse form, but for the quinine-wine which had been taken as a preventive. No other febrile disease of any consequence occurred in the Childers for several months subsequently, nor in fact until she had been for some time stationed on the southern division of the command, when four cases took place, after she had been eight days at anchor in the river Congo. The Firefly did not arrive on the station until August. Shortly afterwards she proceeded on a cruise off the river Pongas, while her boats, armed with white men, were sent up the river. They took Quinine wine night and morning while absent, and continued its use for ten days after they returned, and all escaped fever. Subsequently a few cases were contracted from long continued exposure to the miasmatic exhalations in the river Lagos. Eighteen cases of remitting and fourteen of intermitting fever occurred in the Hecate—the majority of the former were contracted on shore ; two ended in death. The subject of one of the latter was a marine, who accidentally drifted away in the life-boat over the bar at Lagos ; slept one night on shore, and was not attacked until fourteen days afterwards. In the other case, the patient, an officer, slept two nights on shore, and exposed himself to the full glare of the sun during the day time, by rowing about in a boat, without an awning, in the lagoon off Lagos ; he declined taking Quinine as a preventive, and was attacked about fourteen days after he returned on board.

The Merlin arrived on the station about the middle of July, and after cruising a short while off the rivers Nunez and Congas, proceeded to the Bight of Biafra. She was then ordered on special service up the rivers Bonny, New Calabar and Brass ; while thus employed, the following precautionary measures were adopted against fever : The crew were turned up at 5.30 A. M., after dressing, took half a wineglassfull of quinine wine ; they breakfasted at 6. The decks were washed with water (warm) from the boilers at 6.30 ; they took dinner at noon, and supped at 5 P. M. No white men were sent away in boats. Serge frocks and white trousers were worn during the day, and blanket dresses during the night. No water was allowed to be drawn

from alongside for any purpose whatever. Quinine wine was administered to the whole crew for fourteen days after leaving the rivers, in which they remained altogether twelve days. Whether it was owing to the above measures it is impossible to state, but no sickness of any kind followed the several expeditions into these notoriously unhealthy localities. Although twenty-three cases occurred in this vessel, only one out of the whole number was of a severe character, and it was the result of intemperance and exposure on shore on the Isles de Los. The records of the other vessels all substantiated the great value of Quinine as a prophylactic.

It thus appears, that in all these vessels, with a mean force of about 1,680 men, there were only seven deaths from fever, being in the ratio of about a little more than four to the thousand, a mortality so small compared with that of former years, seems almost incredible, and might well lead to the belief that the coast, like some of the cleared portions of the North American Continent, is becoming more healthy ; but, with the exception of the non-appearance of yellow fever, which does not depend on terrestrial emanations alone, the climate has undergone no salutary change.

The seemingly interminable forests which fringe the estuaries of every tidal river, are still as prolific of the fever poison as they were in times gone by, when the death-rate in the squadron was ten times greater. How then, it may be asked, are we to account for this improvement ? Simply by the change which has taken place in the mode of conducting the duties of the station. By a wise and humane regulation, the deadly practice of sending boats away on detached service, to watch or intercept slaves, has been interdicted, or at all events, greatly restricted. Prize crews are no longer turned adrift to wander through the streets of Sierra Leone, when the vessels they navigate from distant parts of the station are delivered up to the authorities of the Mixed Commission Court ; the orgies of 'the barn,' which lowered the character of the white man in the eyes of the black, have long since ceased ; *and last, though not least, the introduction of quinine wine as a preventive of fever has not only reduced the*

number of febrile attacks, but has lessened the severity of those which do occur, and thus the mortality has also been reduced to a level which does not materially exceed the death-rate from fever on some of the more healthy stations.

There has also been a great change in the medical treatment of febrile disease : the so-called active measures which were in vogue but a few years since, have given place to others of a more rational character. Blood-letting is no longer carried to an extent which leaves the patient but little chance of recovery when the fever terminates, and the rash and empirical use of calomel in large and frequently repeated doses, to produce ptyalism, has been abandoned—not only on account of the impossibility of producing ptyalism while the fever lasts, but because mercury, given to excess in any form, has a most injurious effect on the constitution. If these changes have had no effect in reducing the mortality, they, at all events, have lessened the sufferings and misery entailed on patients, who though they survived the fever, lingered long in a state of debility from the effects of blood-letting and mercury.—*Statistical Report of the Health of the Royal Navy for the year 1856, ordered by the House of Commons to be printed 26th July, 1858 : pp. 110–116.*

In 1857 there were nineteen vessels employed on the African station, with a mean force, corrected for time, of about 1620 men, including Kroomen and liberated Africans. The number daily ineffective from wounds and sickness averaged 112, or in the ratio of 69.3 to the 1,000 of mean force, which exceeds the ratio of the preceding year by seven. The total number of dead, exclusive of those lost by shipwreck, amounted to thirty-six—twenty-seven from disease, one from poison and eight from accidental causes ; on the whole, therefore, the mortality was somewhat greater than in 1856. During the year, eleven cases of endemic fever terminated in death : the ratio per 1,000, 6.7, and although nearly a third greater than in 1856, it is still not greater than the mortality of some of the healthiest stations, and incomparably less than the mortality upon the African station, before the use of Quinine wine.

The following summary, taken from the medical journals of

the squadron, affords additional proof of the usefulness of Quinine as a prophylactic.

In the Trident there were forty cases of fever, but no death occurred: the greater number of these cases were contracted in the rivers which enter the sea in the Bight of Biafra. Quinine wine was freely used as a preventive. On two occasions when boats were sent up the Congo, the white men took quinine while in the river, and for fourteen days after they left it, and no fever of any consequence followed.

Fourteen cases occurred in the Sappho: they were nearly all contracted in boating expeditions up the river Congo. Quinine wine was administered to the men on these occasions, but several who did not take it regularly were attacked. Twenty men were employed off and on between the 30th of April and the 11th of May, on this service, watching a suspected vessel in the Congo. The medicated wine was administered carefully according to the printed circular. Only four men were attacked by fever, the disease showing itself about three weeks after they ceased taking the wine. In the Myrmidon and Pluto there were but few cases of fever, though they were employed on some of the most unhealthy places on the station: the former was laid on the beach at Sierra Leone, to be repaired, meanwhile her crew took up their abode in an old hulk which lay in the harbor. Some of the men, however, together with several of the Pluto's crew, were employed, both by day and night, as their work depended on the tide, in patching up the hull of the vessel. To these men quinine wine was administered twice daily, and the executive officers took care that they did not straggle into the town or bush; consequently no case of serious illness followed.

The gig and pinnace of the Aleeto, manned by fourteen white men and six Kroomen, were sent about 150 miles up the Congo, late in December, with presents for one of the petty chiefs; they returned on the 6th of January, and between the 12th and the 18th every white man, with two exceptions, was attacked with fever. The same boats were again sent up the river to the same place on the 14th, when the two persons who had escaped fever formerly were now attacked, though one of them was not:

taken ill until thirty days afterwards. With the exception of these two persons the boat's crew on the second expedition were made up of Kroomen, who, as usual, entirely escaped. On these expeditions, an ounce of quinine wine was given to the white men daily during their absence from the ship ; but it appears to have been discontinued on their return. In January the boats of this vessel were again detached to cruise in the Congo, but did not proceed more than 40 miles up the river. Quinine was given to the men during their absence and for 14 days after their return. The same precaution was adopted after any subsequent exposure to malaria in the river, and no case of fever followed. The Bloodhound was employed in January in the River Benin, and during July in the Congo ; as long as she remained within these rivers, and for ten days afterwards, four grains of quinine in a quarter of a gill of rum, was administered to every white man on board. One case only resulted from these two expeditions ; and in that instance, the person attacked had exposed himself in a most imprudent manner while shooting wild fowl amidst the slimy ooze in the mangrove thickets on the banks of the Benin ; whether the patient took quinine as a preventive is not mentioned.

Three boats from the Childers went up the Congo, as far as Ponto da Linha, and were absent for several days ; quinine was administered to the white men, and no fever resulted.

In May, two boats were sent from the Hecla up the river Nunez, and returned on the following day. Quinine wine was issued in the usual manner, and no febrile disease followed.

In July, the same vessel entered the Sherbro, and subsequently her boats, containing fifty-six seamen and marines, with the usual number of officers, ascended the river to the village Victoria—they returned the same evening and rejoined the vessel, which remained in the river for a few days longer. Quinine in rum (the quinine wine having been all used) was given to the crew while she remained in the river, and for fourteen days after she went to sea. "Eight cases of intermitting fever," the surgeon remarks, "were added to the list a few days after our departure; they were, however, all mild, and terminated favorably, after an

average of seven days' treatment. To the regular and timely administration of quinine, I think our immunity from fever may be fairly ascribed; the cases that did occur were no doubt modified by the prophylactic. That this was the case, the mortality amongst the crews of the merchant shipping frequenting the river, and by whom no preventive is used, bears ample testimony."

On the 23 of May, three officers landed at Lagos from the *Hecate*, intending to return on board the following morning; but, as frequently happens on this coast, the surf rose suddenly, and continued so long, that they could not return to the vessel until the 29th. Again, on the 2d of August, the pinnace, with seven white men in it, was detached, to cruise in-shore between Little Popoe and Whydah, where she remained until the 8th. Quinine was given on both these occasions, and no fever resulted. On the evening of the 27th of November, the same boat and a gig, with nine white men on board, were left off Shark's Point, to guard the entrance to the Congo. An ounce of quinine wine was given to the men each morning. The boats remained in the same position until the morning of 30th, when they took advantage of a sea breeze, and proceeded up the river to Ponto da Linha. The gig, with one officer and two white men, returned on the 2d, and the other boat on the 5th of December. During their absence they had fine weather, and all returned apparently in good health. Quinine was now substituted for the quinine wine; four grains were given daily to each person at seven in the morning; but, notwithstanding this, nine out of the eleven were attacked by remitting fever.

The *Merlin*, between the 1st of January and the 30th of September entered the rivers Calebar and Cameroons, in the Bight of Biafra; she also entered the Nunez several times while on the northern division of the station. During the time she was in these river, and for some time after she had left them, quinine wine was duly administed to the white men on board, and no febrile disease of much importance took place; but in November, after having entered the Nunez and Pongas for the purpose of communicating with the native chiefs, her crew suffered most

severely from remitting fever. Quinine wine was given to the crew for some time, but the supply being exhausted, quinine in rum was substituted. When the change took place is not specified; but in connexion with the substitution of quinine purchased on the coast, and issued in the same manner in the Hecla, the quality of the alkaloid in both instances may be doubted. The Myrmidon was employed in the River Bonny, and afterwards lay a long time in Clearance Cove, Fernando Po; during the entire period quinine wine was given in the prescribed form; only one slight case of eliminatorial fever occurred. At Sierra Leone, while the vessel was under repairs, the whole crew took quinine once a day, and those who were engaged on the shore, twice; still though the latter were at work night and day, only one case of remitting fever resulted. In the same manner, the Pluto was laid in the beach at Sierra Leone early in March for repairs. The carpenters, together with the carpenters of the Hecla, and a number of blue-jackets who were employed on her, took the prescribed measure of quinine wine before going to work, and on leaving off; but the men who remained on the hulk took one measure only every morning until the 28th. Two men who had not been out of the ship were subsequently attacked with fever, but so long after the vessel had gone to sea, that the disease can hardly be ascribed to miasmata from the land at Sierra Leone.

It is worthy of notice that in the preceding instances, when quinine wine was administered according to the instructions issued with it, no fever of any consequence followed exposure to land or swamp miasmata; but on two occasions, when quinine purchased on the coast was substituted, and once when the wine was suddenly discontinued after the exposure, a considerable number of men were attacked, owing, it is to be supposed, to the discontinuance of the quinine wine in one instance, and to its bad quality in the other, for it is well known that, like other high priced remedies, it does not escape adulteration when it falls into the hands of dishonest traders.—*Statistical Report of the Health of the Royal Navy, for the year 1857. Ordered by the House of Commons to be printed, 2d August, 1859, pp. 78-85.*